

What is claimed is:

- 1                    1.        A light emitting device comprising:
  - 2                    (a)        a primary light source which emits primary light; and
  - 3                    (b)        a phosphor material which absorbs at least a portion of the primary
  - 4 light and emits a secondary light, wherein the secondary light or the combination of the
  - 5 secondary light with the primary light comprises a white light with a color rendering index
  - 6 of at least 90.
- 1                    2.        The light emitting device of claim 1, wherein white light has a color
- 2 rendering index of at least 95.
- 1                    3.        The light emitting device of claim 1, wherein the white light has a
- 2 color rendering index of 100.
- 1                    4.        The light emitting device of claim 1, wherein the device produces
- 2 white light with an efficiency of at least 30 lm/w.
- 1                    5.        The light emitting device of claim 1, wherein the primary light is
- 2 ultraviolet or blue light.
- 1                    6.        The light emitting device of claim 1, wherein the primary light
- 2 comprises wavelengths of from 320 nm to 480 nm and the secondary light has a lower
- 3 energy than the primary light.
- 1                    7.        The light emitting device of claim 6, wherein the primary light
- 2 source is a light emitting diode.
- 1                    8.        The light emitting device of claim 1, wherein the primary light
- 2 source is an infrared light source and the secondary light has a higher energy than the
- 3 infrared light.
- 1                    9.        The light emitting device of claim 8, wherein the primary light
- 2 source is a red light emitting diode.
- 1                    10.       The light emitting device of claim 1, wherein the phosphor material
- 2 comprises a plurality of nanoparticles.

- 1                    11.     The light emitting device of claim 10, wherein the nanoparticles  
2     comprise a Group IV semiconductor.
- 1                    12.     The light emitting device of claim 10, wherein the nanoparticles  
2     have an average particle diameter of from about 1 to about 150 angstroms.
- 1                    13.     The light emitting device of claim 1, wherein the phosphor material  
2     has an emission profile comprising red, green and blue emission peaks.
- 1                    14.     The light emitting device of claim 11, wherein the Group IV  
2     semiconductor is silicon.
- 1                    15.     The light emitting device of claim 11, wherein the Group IV  
2     semiconductor is germanium.
- 1                    16.     A light emitting device comprising:  
2                    (a)     a primary light source which emits primary light; and  
3                    (b)     a phosphor material comprising a plurality of nanoparticles which  
4     absorb at least a portion of the primary light and emit a secondary light, wherein the  
5     secondary light or the combination of the secondary light with the primary light comprises  
6     a white light and further wherein the white light is produced with an efficiency of at least  
7     30 lm/w.
- 1                    17.     The light emitting device of claim 16, wherein the nanoparticles  
2     comprise a Group IV semiconductor.
- 1                    18.     The light emitting device of claim 17, wherein the nanoparticles  
2     have an average particle diameter of from about 1 to about 150 angstroms.
- 1                    19.     The light emitting device of claim 16, wherein the phosphor material  
2     has an emission profile comprising red, green and blue emission peaks.
- 1                    20.     The light emitting device of claim 17, wherein the Group IV  
2     semiconductor is silicon.
- 1                    21.     The light emitting device of claim 17, wherein the Group IV  
2     semiconductor is germanium.

- 1                    22.    A light emitting device comprising:
- 2                    (a)    a primary light source which emits primary light; and
- 3                    (b)    a phosphor material comprising a plurality of nanoparticles, the
- 4 nanoparticles comprising a Group IV semiconductor, which absorbs at least a portion of
- 5 the primary light and emits a secondary light, wherein the secondary light or the
- 6 combination of the secondary light with the primary light comprises a white light.
- 1                    23.    The light emitting device of claim 22, wherein the primary light is
- 2 ultraviolet or blue light.
- 1                    24.    The light emitting device of claim 22, wherein the primary light
- 2 comprises wavelengths of from 320 nm to 480 nm and the secondary light has a lower
- 3 energy than the primary light.
- 1                    25.    The light emitting device of claim 24, wherein the primary light
- 2 source is a blue light emitting diode or an ultraviolet light emitting diode.
- 1                    26.    The light emitting device of claim 23, wherein the primary light
- 2 source is a fluorescent lamp.
- 1                    27.    The light emitting device of claim 22, wherein the primary light
- 2 source is an infrared light source and the secondary light has a higher energy than the
- 3 infrared light.
- 1                    28.    The light emitting device of claim 27, wherein the primary light
- 2 source is a red light emitting diode.
- 1                    29.    The light emitting device of claim 27, wherein the primary light is a
- 2 halogen lamp or an incandescent lamp.
- 1                    30.    The light emitting device of claim 22, wherein the nanoparticles
- 2 have an average particle diameter of from about 1 to about 150 angstroms.
- 1                    31.    The light emitting device of claim 22, wherein the phosphor material
- 2 has an emission profile comprising emission peaks in the green to red regions of the visible
- 3 spectrum.

1                    32.     The light emitting device of claim 22, wherein the phosphor material  
2     has an emission profile comprising emission peaks in the blue to red regions of the visible  
3     spectrum.

1                    33.     The light emitting device of claim 22, wherein the Group IV  
2     semiconductor is silicon.

1                    34.     The light emitting device of claim 22, wherein the Group IV  
2     semiconductor is germanium.

1                    35.     The light emitting device of claim 22, wherein the nanoparticles  
2     comprises core/shell nanoparticles comprising a Group IV semiconductor core and an  
3     inorganic shell.

1                    36.     The light emitting device of claim 35, wherein the inorganic shell  
2     comprises ZnS or CdS.

1                    37.     The light emitting device of claim 35, wherein the core comprises  
2     silicon and the shell comprises  $\text{Si}_3\text{N}_4$  or SiC.

1                    38.     The light emitting device of claim 35, wherein the core comprises  
2     silicon and the shell comprises Ge.

1                    39.     The light emitting device of claim 35, wherein the core comprises  
2     germanium and the shell comprises Si.

1                    40.     The light emitting device of claim 22, wherein the nanoparticles are  
2     dispersed in a binder.

1                    41.     The light emitting device of claim 22, wherein the primary light  
2     source comprises an electroluminescent device.

1                    42.     The light emitting device of claim 22, wherein the primary light  
2     source comprises an organic light emitting material.

1                    43.     The light emitting device of claim 42, wherein the nanoparticles are  
2     dispersed in the organic light emitting material.

1                    44.     A phosphor material comprising a plurality of luminescent group IV  
2 semiconductor nanoparticles having a polydisperse size distribution dispersed in a binder.

1                    45.     The phosphor material of claim 44, further comprising a plurality of  
2 electroluminescent particles dispersed in the binder.

1                    46.     The phosphor material of claim 44, wherein the binder is an  
2 electroluminescent polymer.

1                    47.     A phosphor material comprising a plurality of domains disposed on  
2 an organic film, each domain comprising a plurality of luminescent semiconductor  
3 nanoparticles having a substantially monodisperse size distribution.

1                    48.     The phosphor material of claim 47, wherein the organic film has a  
2 plurality of luminescent nanoparticles dispersed therein.

1                    49.     The phosphor material of claim 47, wherein the luminescent  
2 nanoparticles dispersed in the organic film have a substantially monodisperse size  
3 distribution.